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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 09/654,315      | 09/01/2000  | Robert S. Chau       | 42390.P4222D2       | 5699             |

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Michael A Bernadicou  
Blakely Sokoloff Taylor & Zafman LLP  
12400 Wilshire Boulevard 7th Floor  
Los Angeles, CA 90025

[REDACTED] EXAMINER

TRAN, THIEN F

| ART UNIT | PAPER NUMBER |
|----------|--------------|
| 2811     | 7            |

DATE MAILED: 04/01/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                        |                     |
|------------------------------|------------------------|---------------------|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b> |
|                              | 09/654,315             | CHAU ET AL.         |
| <b>Examiner</b>              | <b>Art Unit</b>        |                     |
| Thien F Tran                 | 2811                   |                     |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on \_\_\_\_\_.
- 2a) This action is FINAL.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 30-43 is/are pending in the application.
- 4a) Of the above claim(s) 38-43 is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 30-37 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) The proposed drawing correction filed on \_\_\_\_\_ is: a) approved b) disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) The oath or declaration is objected to by the Examiner.

#### Priority under 35 U.S.C. §§ 119 and 120

- 13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) All
  - b) Some \*
  - c) None of:
    1. Certified copies of the priority documents have been received.
    2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
  - a) The translation of the foreign language provisional application has been received.
- 15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

#### Attachment(s)

|   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                           | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 . | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### ***Election/Restrictions***

Applicant's election of claims 30-37 in Paper No. 6 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

### ***Drawings***

Figures 1A-1E should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

### ***Claim Objections***

Claim 34 is objected to because of the following informalities: line 2, "the germanium" should be --the silicon germanium--. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 34 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application

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was filed, had possession of the claimed invention. The isolation region having a top surface positioned below the silicon germanium film is not disclosed and shown in the elected embodiment (see Figs. 4A-4B), therefore, the recitation of the isolation region having a top surface positioned below the silicon germanium film is not supported by the disclosure. In fact, the disclosure (Figs. 4A-4B) shows support for an isolation region 302 having a top surface positioned below the top surface of the silicon germanium film 400 but not below the silicon germanium film 400 as claimed by applicant.

Claim 34 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The disclosure fails to teach one of ordinary skill in the art how a top surface of an isolation region 302 is formed below the silicon germanium film 400. Without this disclosure, one of ordinary skill cannot practice the invention without undue experimentation because of the number of operational parameters in the process.

Claims 36 and 37 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The gate silicide layer having a third thickness greater than a first thickness of a silicon gate electrode is not disclosed and shown in the elected embodiment (see Figs. 4A-4B), therefore, the recitation of the gate silicide layer having a third thickness greater than a first thickness

of a silicon gate electrode is not supported by the disclosure. In fact, the disclosure (Figs. 4A-4B) shows the third thickness of the gate silicide layer 336 about the same or smaller than the first thickness of the silicon gate electrode 320 which is formed below the silicon germanium film 400.

Claims 36 and 37 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The disclosure fails to teach one of ordinary skill in the art how a third thickness of a gate silicide layer is formed greater than a first thickness of a silicon gate electrode. Without this disclosure, one of ordinary skill cannot practice the invention without undue experimentation because of the number of operational parameters in the process.

Claim 37 is necessarily rejected since this claim directly or indirectly depends upon the rejected base claim.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application

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being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 33-35, insofar as in compliance with 35 USC 112, are rejected under 35 U.S.C. 102(e) as being anticipated by Chau et al. (US 6,165,826).

Chau et al. discloses the claimed semiconductor device (Fig. 3H) comprising a pair of source/drain regions 336 formed on opposite sides of a silicon gate electrode 308; a silicon germanium film 322 formed on the source/drain regions; and a silicide layer 342 layer formed on the silicon germanium film.

Regarding claim 34, a top surface of an isolation region 305 is positioned below the top surface of the silicon germanium film 322.

Regarding claim 35, a top surface of an isolation region 305 is positioned below the silicide layer 342.

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 30-32 and 36-37, insofar as in compliance with 35 USC 112, are rejected under 35 U.S.C. 103(a) as being unpatentable over Moslehi (US 5,168,072 of record) in view of Kawaguchi (US 5,739,573 of record).

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Moslehi discloses a semiconductor device (Fig. 19) comprising a silicon gate electrode 50 formed on a gate dielectric 48 formed on a substrate surface, the silicon gate electrode having a first thickness; a gate silicon germanium film 88 formed on the silicon gate electrode, the gate silicon germanium film having a second thickness; a gate silicide layer 100 formed on the gate silicon germanium film, the gate silicide layer having a third thickness, the third thickness greater than the first thickness; a pair of sidewall spacers (56, 60) on opposite sides of the silicon gate electrode, the sidewall spacers having a first height above the substrate surface, the first height is equal to the sum of the first and second and third thicknesses; a pair of source/drain regions (58, 64) formed on opposite sides of the silicon gate electrode; a source/drain silicon germanium film 87 formed on the source/drain regions; and a source/drain silicide layer 98 formed on the source/drain silicon germanium film. Moslehi does not disclose the sidewall spacers having a first height greater than the sum of the first and second and third thicknesses. Kawaguchi discloses a semiconductor device (Fig. 11) comprising sidewall spacers 214cb extending above the top of the gate 213c. It would have been obvious to a person having ordinary skill in the art at the time the invention was made to extend the first height of the sidewall spacers (56, 60) greater than the sum of the first and second and third thicknesses of the gate (50, 88, 100) as taught by Kawaguchi in order to eliminate the bridging (shorting) problems between the gate silicide layer and the source/drain silicide layer.

Regarding claims 31 and 37, the silicon gate electrode is polysilicon.

### ***Conclusion***

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thien F Tran whose telephone number is (703) 308-4108. The examiner can normally be reached on 7:00AM - 3:30PM Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

tt  
March 22, 2002



Thien Tran  
Patent Examiner  
Technology Center 2800